13. Page Design in Web Applications

13.1 Browser Capabilities in a Web Environment

A browser renders information that has been specified in a markup language such as HTML in a standard format on different platforms. The browser provides the window from which users access a Web application. In most browsers, this window includes a menu bar, toolbar, location indicator, viewing area, and status bar, as shown in figure 13-1. The menu bar provides options for locating and managing Web information and for configuring features of the browser itself and the information in the viewing area. The location indicator lists the address of the Web page currently viewed, while the viewing area displays the page content. The status bar identifies the destination of a hyperlink and indicates the rate at which a page is being downloaded.
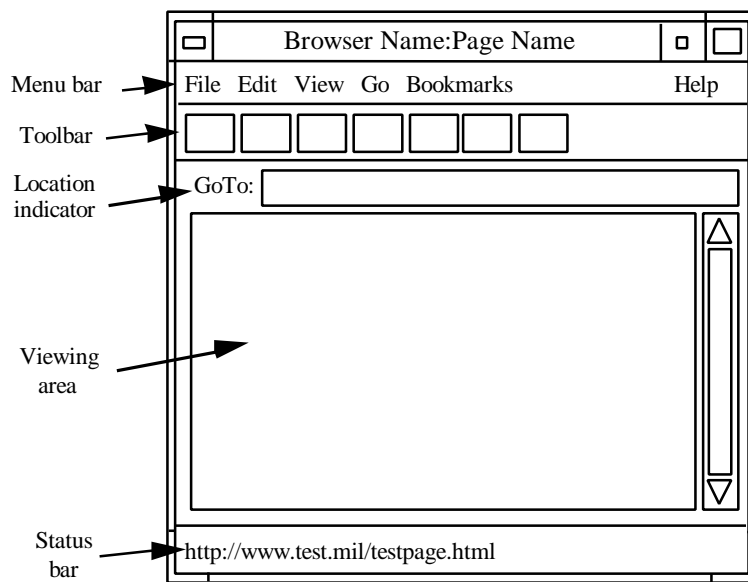
Figure 13-1. Components of a browser window.

A browser supports multiple mechanisms for navigating within a Web application. These mechanisms can be built into the browser or available on the page itself. A browser can be expected to provide the following navigation functions:

·   Bidirectional tracking - The browser supports navigation to the page that was previously viewed (e.g., by selecting a Back button in the toolbar). This page may be in another part of the application or in a different application. The browser also supports navigation to the next page (e.g., by selecting a Forward button in the toolbar) after the user has executed a backtracking action.

·   History list - The browser maintains a list of the pages (e.g., in a History or Go menu) that have been viewed during the current session; when the user selects an item on the list, the browser navigates to that page.

·   Bookmarks - The browser supports bookmark annotation for users to identify individual pages of interest; when the user selects a page that has been marked (e.g., in a Bookmarks menu), the browser navigates to that page.

·   Hyperlinks - When the user places the pointer on a hyperlink, the browser displays the name of the destination in the status bar. When the user selects the link, the browser navigates to that destination; when the user returns to the page containing the link, the browser changes the appearance of the link to indicate that the destination has been visited.

13.2 Web Application Design

A Web application[1] provides a view into a network of information nodes connected by links. The unit for viewing the content of a particular node is the page. In a Web application, the nodes are represented as a collection of navigation and information pages, as shown in figure 13-2. A home page presents an overview of the application structure, with links to all major content areas and support tools. For example, the home page might provide links to a status page and various search tools and navigation aids for locating information in the application (e.g., branches (1) and (2) in the figure). Other navigation pages further subdivide the top-level structure and provide links to subordinate nodes in the network. Information pages present detailed information content and may include links to other pages in the application or in other applications. Access to this content is provided at varying levels of nesting below the home page (e.g., branches (3), (4), and (5) in the figure).
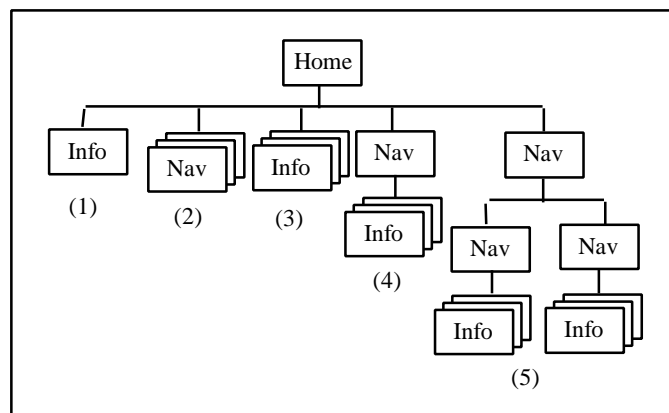

Figure 13-2. Example Web application structure.

Hyperlinks provide the connectivity among nodes in the network, allowing users to navigate among nodes in nonlinear ways and to follow different paths at different times. The application defines links to complement the navigation mechanisms provided by the browser so that users can easily explore the information space. At a minimum, the application supports navigation to the page(s) above and below the current one in the structure, navigation to sibling pages and other portions of the application, and navigation to support tools such as search, feedback, and help.

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[1] These specifications refer to a "Web application" (rather than a "Web site") in order to focus on user interface design that supports effective information access and interaction by the warfighter.

The links are bi-directional, allowing the user to move up to the home page or other navigation pages as well as downward through chains of linked pages.

The application is organized into a hierarchy of navigation and information pages that supports both mission and user requirements. If desired, application content can follow a metaphor or theme that is familiar to users and will assist them in locating and understanding the information they are seeking. For example, access to online documents can be organized in the form of a document library, and information about an organization can be represented graphically in an organization chart or office floorplan. If the application will be used by different audiences, it provides multiple paths through the hierarchy, each leading to the same information content. The application also supports multiple methods of information access. Users can browse information efficiently as well as use search capabilities (e.g., index, keyword search) to locate information quickly. If the information structure is complex, the application includes a site map or directory that provides a global overview of the structure, with links that directly access its contents.

The information structure of an application can be shallow or deep, depending on the amount of branching within the structure and the granularity of the information on individual pages. Some Web style guides recommend using a structure that is as shallow as possible, while others argue against a structure that is too deep or too shallow. DII specifications recommend that the application be designed so that whenever possible, users traverse no more than four levels in order to reach the information they seek.

13.3 Web Page Design

13.3.1 Elements of a Web Page

A Web page has a title that is displayed in the title bar of the browser window when the page appears in the viewing area. The content of the page itself is organized into a header, body, and footer, as shown in figure 13-3.
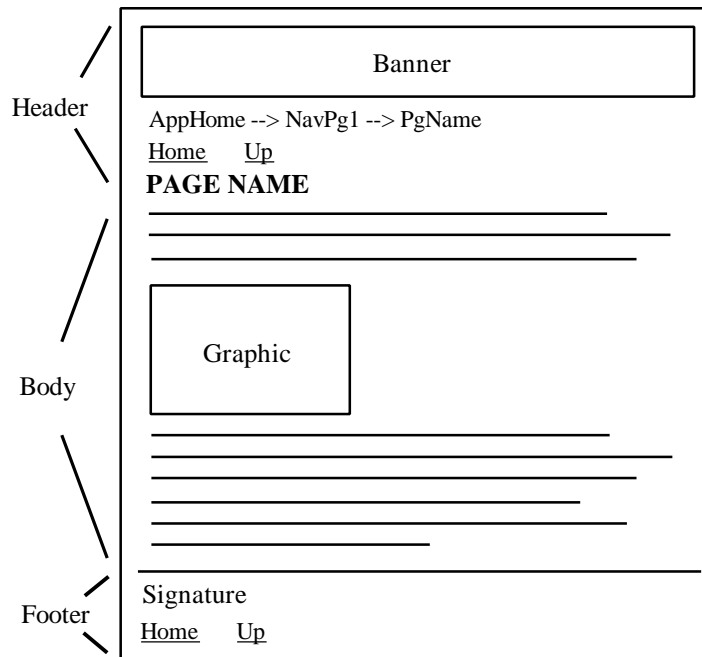
Figure 13-3. Elements of a Web page.

13.3.1.1 Page Title

The page title (specified by the <title> tag) identifies the concept presented on the page. The title is descriptive of page content so users can identify the page if they navigate to it from outside the application or if they create a bookmark for the page (and the title is included in a Bookmark list by the browser). The title does not exceed 64 characters in length (so it is not truncated when displayed by the browser); a long page name can be shortened to fit in the space available.

13.3.1.2 Page Header

The page header includes a navigation bar and page name and may include (1) a banner graphic, (2) a page path that identifies the path to the current page from the home page, (3) security markings if the content of the page is classified, and (4) a separator to delimit header content from the body of the page. The page name is the same as the page title. If a banner graphic is included in the header, it is placed at the top of the header and is sized so that it fits within the viewing area without scrolling horizontally. The navigation bar and page path are described in section 13.3.2.

13.3.1.3 Page Body

Navigation page. The body of a navigation page (e.g., a home page) contains text and/or graphic links to information pages or other navigation pages in the application. Figure 13-4 is an example of a text-based navigation page that presents the contents of a document library. The design of graphics-based navigation pages is addressed in section 14.2.2 on image maps. Whenever possible, a navigation page (such as a home page) is short enough to view without scrolling; the page does not exceed three screens in length.

```
┌─────────────────────────────────────┐
│  ┌───────────────────────────────┐  │
│  │            Banner             │  │
│  └───────────────────────────────┘  │
│                                      │
│   Home    Up                         │
│   LIBRARY CONTENTS                   │
│                                      │
│   Program Documentation              │
│      Document Title                  │
│         Description of document      │
│         contents.                    │
│      Document Title                  │
│         Description of document      │
│         contents.                    │
│   Briefings                          │
│      Briefing Title                  │
│         Description of briefing      │
│         contents.                    │
│      Briefing Title                  │
│         Description of briefing      │
│         contents.                    │
│   ─────────────────────────────      │
│                                      │
│   Signature                          │
│   Home    Up                         │
└─────────────────────────────────────┘
```
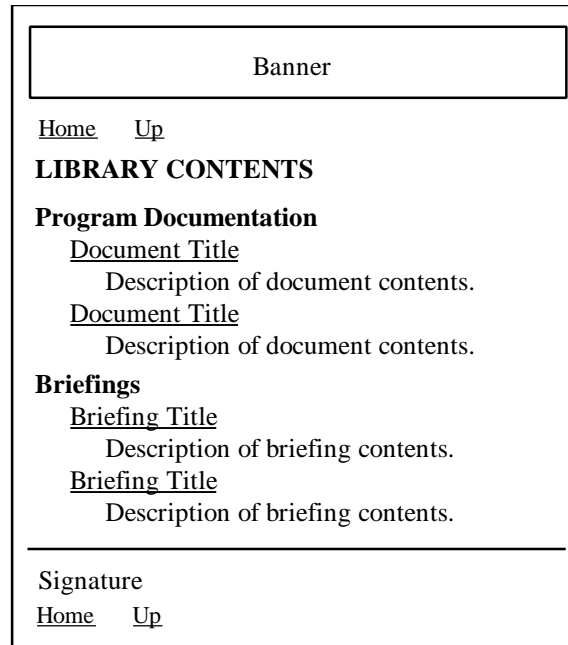
Figure 13-4. Example navigation page.

The links on a navigation page are organized hierarchically, alphabetically, or by frequency of use. The application uses nested lists to group related links and show the structure and relationship among them. Each group contains a heading that explains what is presented in the list so that users know why the links are presented together. Horizontal separators are used to delimit the groups as needed. If desired, each link can be supplemented with a brief summary describing its content so that users can determine if the destination contains the information they are seeking. The summary can also include information about the size or format of the file, if access is password-protected, or if a helper application or plug-in is required. If a summary is included, it follows the link (as shown in figure 13-4); the link is not embedded in the text of the summary.

Index page. The body of an index page, shown in figure 13-5, contains an alphabetical list of keywords identifying topics addressed in the application. The entries in the index are indented and formatted so that users can scan them easily. The keyword can serve as a link to the page with information on that topic, or the page name(s) can be included with the keyword and serve as a link to the information, as in figure 13-5. A letter key is provided at top and bottom of the page; selecting one of the letters navigates to that part of the index.
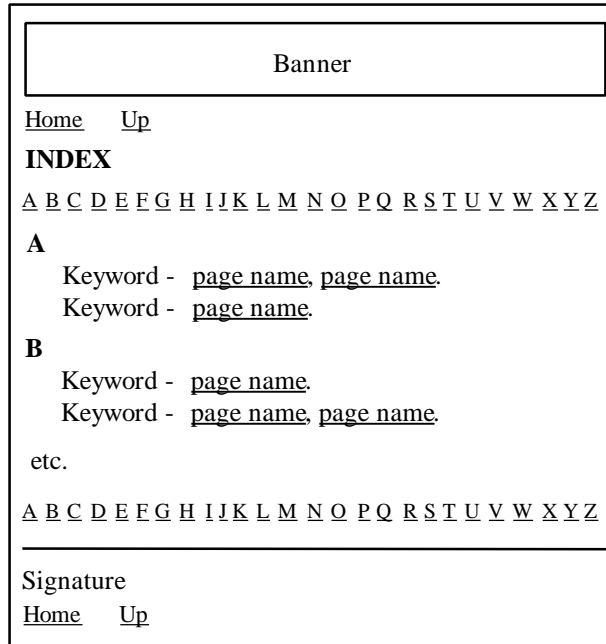
```
┌─────────────────────────────────────────┐
│  ┌─────────────────────────────────────┐ │
│  │              Banner                 │ │
│  └─────────────────────────────────────┘ │
│   Home      Up                            │
│   INDEX                                   │
│   A B C D E F G H I J K L M N O P Q R S T U V W X Y Z │
│   A                                       │
│        Keyword -  page name, page name.   │
│        Keyword -  page name.              │
│   B                                       │
│        Keyword -  page name.              │
│        Keyword -  page name, page name.   │
│    etc.                                   │
│   A B C D E F G H I J K L M N O P Q R S T U V W X Y Z │
│   ──────────────────────────────────     │
│   Signature                               │
│   Home      Up                            │
└─────────────────────────────────────────┘
```

Figure 13-5. Example index page.

Search page. The application can use a commercial search tool or create one that is tailored to application requirements. In the latter case, the body of a search page provides a text entry area where users type a keyword and then activate the search engine that locates each instance of that word. Users are able to specify the parameters of the search and then view a list of "hits" from which to select. The items in the list are ordered based on the extent to which they satisfy the search parameters. The user can choose to perform the search locally (e.g., within a set of specified pages such as a single document or across the application as a whole) or globally (i.e., across the Web applications available to the user).

Information page. An information page does not normally exceed five screens in length. Exceptions may occur in order to accommodate information pages with significantly longer or more complex content.   DII specifications do not support the use of extremely short information pages because they can increase reading time (by requiring users to download the information on individual pages rather than reading it on a single page). The information pages in the application follow a consistent format for text and graphic alignment, use of headings, and header and footer content (see section 13.3.4.2). Specifications related to information presentation are provided in section 14.

13.3.1.4 Page Footer

The footer contains a signature and may also include (1) a navigation bar if the page requires scrolling, (2) information about the page (e.g., status of the content, a copyright notice if applicable, the Web address for the page), (3) security markings if the content of the page is classified, and (4) a separator to delimit footer content from the body of the page.

The signature identifies the page author, institution (if applicable), contact information (e.g., e-mail address), and page creation and/or revision dates. If desired, the mail address can be a live "mailto" link that allows users to send mail to the author. The actual address (rather than some other text) is included in the link so that users with browsers that do not support a mailer can copy the address for use in a separate mail application. The mail address can also be included in the <head> information about the page. This tag provides information about the author in machine-readable form for use by browsers that support a "reply to author" function and by other applications such as Web spiders and other maintenance tools.

13.3.2 Navigation

13.3.2.1 Hyperlinks

The application provides consistent visual cues to indicate when the text and graphics on a page are designated as hyperlinks. A text link is underlined and colored, and a graphic link has a colored border (i.e., the "border" attribute has a non-zero value). Both text and graphic links change color to indicate when the destination has been visited.

The links on a page are easy to identify. A text link consists of a single word or short phrase; the link is not a single letter or number or an entire text passage. Each link accurately describes where it leads so that users can decide if they want to follow the link. A link to an image or with unexpected consequences (e.g., an unusual file format) is identified as such (e.g., in a parenthetical note) and includes its size (especially if very large) and whether it is internal or external to the application (since there may be differences in loading delay and return path). If a graphic is included with the text in a link, the graphic is defined as part of the link and has the same destination as the text.

When users select a link, the action executed is to load a new page, either in the same or a different application. A link does not navigate to itself (i.e., to the top of the page in which the link appears). Each link on a page navigates to a different destination; the same link is not repeated with different names.

13.3.2.2 Navigation Bar

The navigation bar on a page supports local navigation within the application. The links in the bar are arranged horizontally and can be text, graphic, or a combination of the two. If text is used, the links are separated from each other by several spaces and may be preceded and followed by brackets (to serve as additional delimiters). The following is an example of a navigation bar with text links:

[Home]   [Up]   [Previous]   [Next]   [Search]

If graphics are used, all of the buttons are the same size and shape and can include a text label describing their function; the navigation bar also includes a text-only version of the links for users with all-text browsers or browsers with graphics deactivated.

The links in the navigation bar appear in the same order on each page. The application uses the vocabulary in appendix C whenever it performs any of the link actions listed. At a minimum, the navigation bar includes Home and Up links and links to basic utilities (e.g., Search) if these are supported by the application. The navigation bar does not use terminology that duplicates actions supported by the browser (e.g., Back, Forward). Links that are available for selection are underlined; links that are temporarily unavailable are either not included in the navigation bar or are displayed but shown as unavailable (e.g., not colored or underlined).

13.3.2.3 Page Path

The page path is a navigation aid that helps users understand the structure of an application by identifying the sequence of pages that lead to the current page from the home page. For example, the page path shown in figure 13-3 is from the application home page (i.e., "AppHome") to a navigation page (i.e., "NavPg1") and then to the current information page (i.e., "PgName"). If a page path is included on a page, the page names in the path are separated by arrows and can be shortened so that the path fits on a single line. Except for the current page, each name listed in the path is defined as a link that navigates to that page.

13.3.3   Design of Documents

13.3.3.1 Page Design

A document is a collection of pages that contain information on one or more related topics and can be viewed either serially or accessed individually. The document contains a top-level navigation page that provides an overview of the document and serves as the expected entry point for viewing it. The overview presents the title, author, and other identifying information about the document (e.g., version number, last modification date) and provides a short description of its content. If the document is organized in terms of chapters or sections, the overview can include an outline or table of contents listing these headings, with each one linking to that page in the document. The overview can be presented on a single "top" page, or separate overview and table of contents pages can be provided. In addition, more than one contents page may be included if the document is complex (e.g., "Contents at a Glance" and "Detailed Contents") or if there is more than one way for users to view the information in the document.

The information pages in a document follow a common format and provide links that allow users to move through the document in a serial manner and return back to the entry point whenever desired. At a minimum, the header of each page includes the document title and may include other identifying information to help users understand the structure of the document (e.g., the page path for the document). For example, in figure 13-6, the document and chapter titles are included in the header, with the section title used as the page name. The page title of each page in the document includes the document name and page name; both can be shortened as needed to fit in the space available.
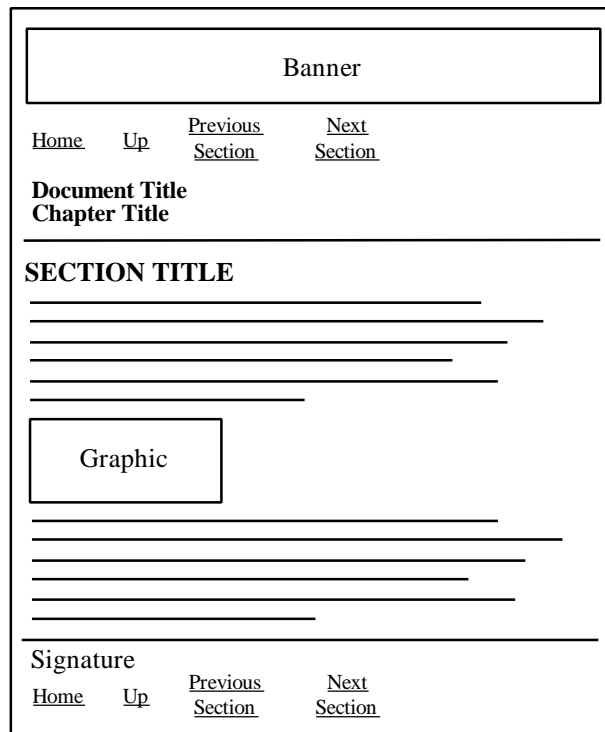
Figure 13-6. Page format in a document.

If the document includes footnotes, they are numbered consecutively within each page. Footnote text is included on the page in which the footnote appears and is not presented on a separate page. If the document includes references to related electronic material available in other applications, the citations list the document author, title, Uniform Resource Locator (URL), and date or version reviewed (e.g., the "last modified" date in the signature for the referenced document). Search and index pages can be included in the document to allow users to locate text that contain certain keywords; the design of these pages is addressed in section 13.3.1.3.

13.3.3.2 Navigation

The application defines links that provide at least one linear path through the pages in the document. The navigation bar on each information page includes Previous and Next links to support serial viewing of document content. If the document is organized in terms of chapters and/or sections, each link indicates the level of the destination (e.g., Next Page, Next Chapter, Previous Page, Previous Chapter). The navigation bar also includes Home and Up links (the latter returning to the overview page for the document). The navigation bar may also include a Contents link if a table of contents page exists for the document and Search and Index links if these features are available for locating information in the document.

When a link in the document jumps to a destination outside the document, it is identified as such so users can decide if they want to follow it and exit the document. The link identifies the destination (by name or description) and does not just list its URL. Links that jump outside the document can be distracting since they draw attention to supplemental information that may be

tangential to the user's purpose. To reduce distraction, the application can create intermediate destinations within the document (e.g., in footnotes or references) that provide with explanatory information and include links to the outside documents.

13.3.4 Considerations in Page Design and Organization

13.3.4.1 Information Accessibility

A Web application is designed so that it can be accessed by users from different platforms that provide a range of viewing configurations and with both fast and slow network connections. At a minimum, users can be expected to have a workstation with a 640 x 480 pixel monitor, although individual systems my specify a larger screen as its default configuration. If the application is expected to be viewed on monitors of varying sizes, the content of each page is arranged so that information (especially graphics) can be viewed on smaller screens with minimal horizontal scrolling.

Users can be assumed to have a minimum network bandwidth of two kilobytes per second and to be willing to wait no more than 20-30 sec. for a Web page of average size to download. As a result, the file size for a page (including all image files) does not exceed 50 kilobytes, with navigation pages kept smaller since they are visited often and need to be loaded quickly. The application notifies users (e.g., includes a size warning) when a file can be expected to take more than 30 sec. to download.

The application is designed to minimize the time required for users to view useful information on a page. Text and images are loaded in ways that allow users to act on the information quickly (e.g., locate the content desired, select another link, return to the previous page). For example, the application places important information at the top of each page. In addition, the application uses file formats and includes attributes (e.g., "alt," "height," "width") in the HTML tags for images and tables that will speed their layout and display (see section 14).

While most users can be expected to have a color-capable graphical browser, some low-end systems may be limited to an all-text browser (or a browser that allows graphics to be deactivated) and a monochrome monitor. The application accommodates different browsers and platforms by providing redundant access to graphic information whenever possible (e.g., by displaying text-based links below the graphic ones on navigation pages, including text-only versions of pages that contain graphics) and informs users when graphics cannot be displayed. Similarly, the application anticipates the ways in which information will be used by making critical content available in alternate formats (e.g., in word processing format for downloading, in a single file for printing). The application includes instructions on how to download a file and indicates whether other software is needed to use the information once it is downloaded, where to obtain the software, and how it works.

13.3.4.2 Information Consistency

The application defines a style template that is applied in designing the format of all pages. This template specifies color schemes, page backgrounds, and size and position of text and graphic elements on each page. If desired, the application can create a standard graphic banner or text-

based header that is used on each page. The banner or header combines common graphic elements (e.g., an application "logo") with features that relate to the content of individual pages or sets of pages (e.g., in a document) in the application. The application can also include a standard text- or graphic-based navigation bar and define a standard footer that provides a single method for signature.

13.3.4.3 Information Labeling

The URL for the application defines its Web address, with the path and file portions of the address uniquely identifying each page in the application. Users frequently rely on these addresses to understand the structure of the information they are viewing. As a result, the application defines its URLs so they have readable names that reflect the nature of the information they contain. The application uses only lower-case characters in its URLs so as to minimize the risk of errors when users type an address. To ensure portability across platforms, the application includes the appropriate file extension for the content type (e.g., .gif for GIF files), uses only alphanumeric characters and underscore, hyphen, and period in its file names, and limits filename length to less than 32 characters.

The application includes all official notices concerning access to and use of DoD Web sites. This information is presented on the home page or accessible from it. If the application makes use of copyrighted information from other Web sites, it obtains permission from the copyright holder before doing so. If the application is available as a public Web site, its contents have been approved for releasability and all of its links navigate to other publicly available sites.

If the application relies on the presence of certain browser features (e.g., Java-enabled) or display settings (e.g., color schemes), it informs users of these requirements (e.g., on the home page) and provides information on the required configuration.

13.3.4.4 Information Updating and Maintenance

The linking of pages in the application is simple enough to allow application content to be updated quickly and easily. When an update occurs, all local links within the application are tested to ensure the destinations are valid, and all remote links are checked to ensure they remain active and are being maintained. Pages that are time-sensitive or address a topic that changes frequently are checked for currency, and out-of-date information is removed. When the URL for the application is changed, a page with the old address is provided that identifies the new address and includes a link to it.

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